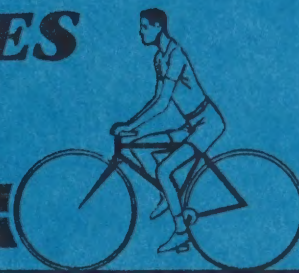


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BICYCLE COMPATIBLE ROADWAYS- PLANNING AND DESIGN GUIDELINES



DEC. 1982

THE NEW JERSEY

DEPARTMENT OF TRANSPORTATION

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BICYCLE COMPATIBLE ROADWAYS --

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New Jersey Department of Transportation
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December 1982

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INTRODUCTION

The bicycle has considerable potential to serve as a means of personnel transportation, particularly for short trips. It doesn't pollute the air, it requires no non-renewable energy sources and is relatively inexpensive to own and operate.

The bicycle is, however, an underutilized transportation mode, partly because many parts of our transportation network cannot accommodate its traffic. Unfortunately, there is no quick solution for this situation. It developed over a period of many years and will take many years to correct.

It is the policy of the New Jersey Department of Transportation (NJDOT) to promote the increased use of the bicycle as a means of personnel transportation and to provide for bicycle traffic by taking into account the needs of this mode in all state-funded transportation projects and programs. Policy statements extracted from the NJDOT Transportation Plan which pertain to bicycle transportation appear in Appendix I. On October 14, 1981, the department issued 11 planning and design guidelines for bicycle transportation (see Appendix I). This report expands those initial guidelines. It provides explanations and sketches to help those responsible for state-funded transportation improvements follow the guidelines and comply with state policy.

Even this expanded version of the guidelines cannot deal with all circumstances or situations. Where unique or site specific conditions are encountered or where conflicting needs arise, sound engineering judgment must be applied to achieve solutions that are in keeping with the spirit and purpose of NJDOT policy.

Project by project, the persistent application of these guidelines on all state-funded transportation projects will eventually provide safe transportation for the moderately skilled bicyclist who operates a properly fitted and maintained vehicle in accordance with the rules of the road.

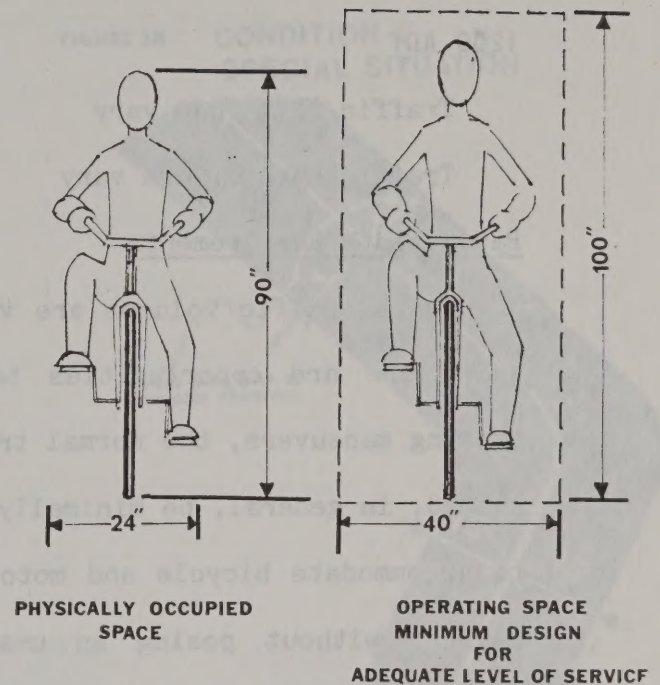
PLANNING AND DESIGN GUIDELINES FOR BICYCLES

1. SPACE FOR LANE-SHARING

While many variables affect the ability of a roadway to support bicycle traffic, sufficient width is the critical variable as it delimits the bicyclist's operating space. (Figures 1 & 2) In order for bicycles and motor vehicles to share the use of road or highway facilities without unduly compromising one another's level of service or safety, the facility should provide sufficient width of paved surface to accommodate both modes.

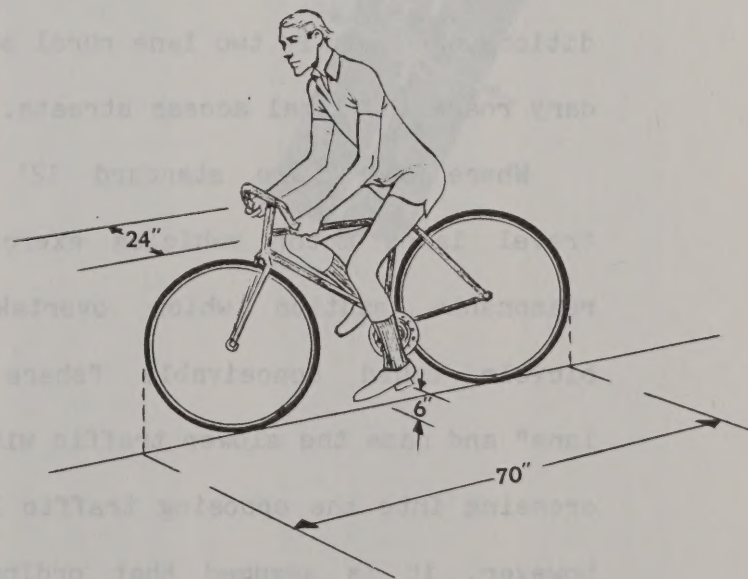
The amount of width necessary to achieve this result is determined primarily by traffic volumes, mix and speeds. Analysis of these variables discloses three general sets of conditions which call for three different widths of usable paved surface in the right hand lane (curb lane) or right hand lane plus shoulder (if a usable paved shoulder exists). These are as follows:

FIGURE 1



BICYCLE SPACE REQUIREMENTS

FIGURE 2



CONDITION I

Traffic volumes: light, less than

1200 ADT

Traffic mix: can vary

Traffic speeds: can vary

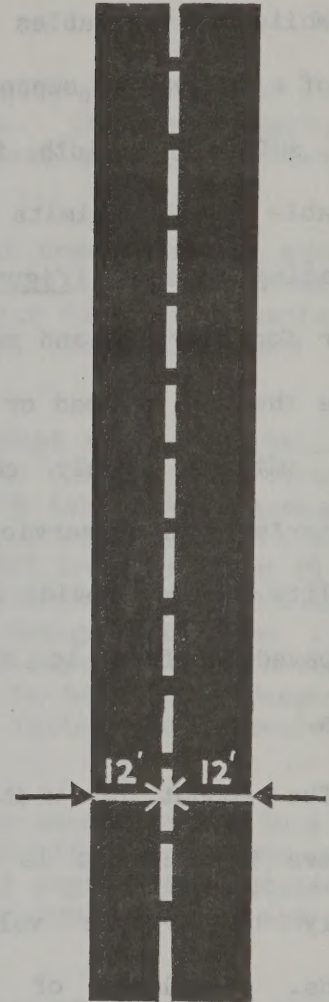
Paved Width Requirements

Where traffic volumes are very light and there are opportunities to execute passing maneuvers, the normal travel lane should, in general, be minimally adequate to accommodate bicycle and motor vehicle traffic without posing an unacceptable negative impact on safety or motor vehicle traffic level of service (Figure 3A). Roadways meeting these conditions are usually two lane rural secondary roads and local access streets.

Where there are standard 12' wide travel lanes motor vehicles exercising reasonable caution which overtake a bicycle could conceivably "share the lane" and pass the slower traffic without crossing into the opposing traffic lane; however, it is assumed that ordinarily the overtaking motor vehicle will cross over into the opposing traffic lane to pass. Therefore, it will be necessary

FIGURE 3A

CONDITION I



for overtaking traffic to patiently wait until a "pass" can be safely executed, resulting in some delay to overtaking traffic. However, in light traffic volumes, this diminution of the level of service should be minimal.

Special Situations

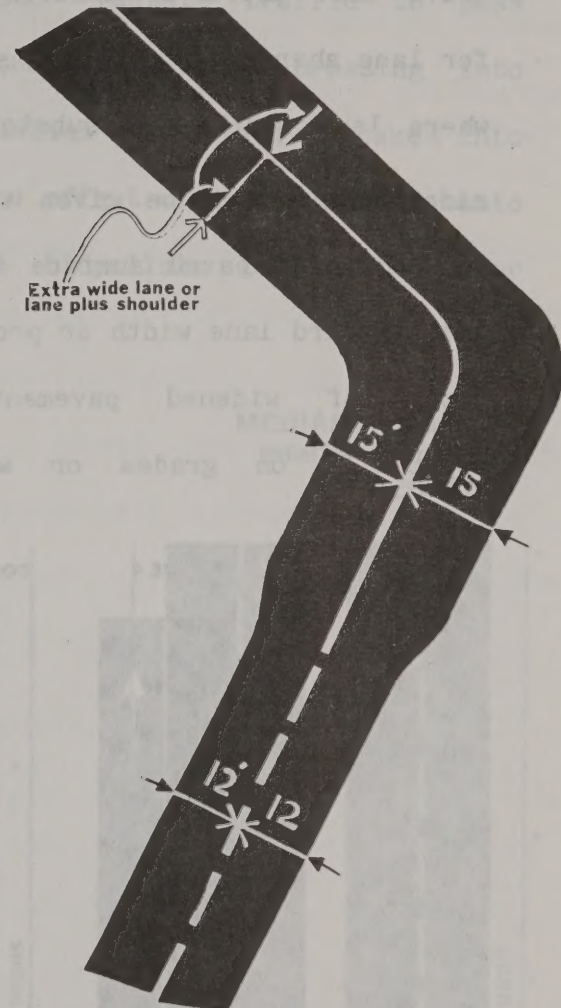
Even where traffic volumes are very light special situations may indicate the need for extra width of paved surface, i.e., greater than standard 12' wide travel lane (Figure 3B). On sections of roadway where excessive grades (greater than 5%) might result in bicycle traffic causing unacceptable delays to motorized traffic or where poor sight distances limit the opportunity of overtaking motor vehicles to execute passing maneuvers, consideration should be given to providing extra width of paved surface to enable motorized traffic to pass slower bicycle traffic without crossing into the oncoming traffic lane.

Substandard Lane Width

On roadways with outside lane widths (or lane plus shoulder widths) less than 12' overtaking motor vehicles must cross

FIGURE 3B

CONDITION I SPECIAL SITUATION



over into the opposing traffic lane to execute a passing maneuver. This will be reinforced by the common (and recommended) practice by bicyclists of moving left to "take the lane" where they perceive that there is insufficient width for lane sharing. On sections of roadway where lane widths are substandard, consideration should be given to extending the width of paved surface to at least the standard lane width or providing sections of widened pavement surface, especially on grades or where sight

distances are poor to facilitate passing of bicycle traffic by overtaking vehicles.

CONDITION IIA

Traffic volumes: moderate to heavy
(greater than 1200 ADT)

Traffic mix: minimal volumes of heavy trucks

Traffic speeds: 55 mph or less
or

CONDITION IIB

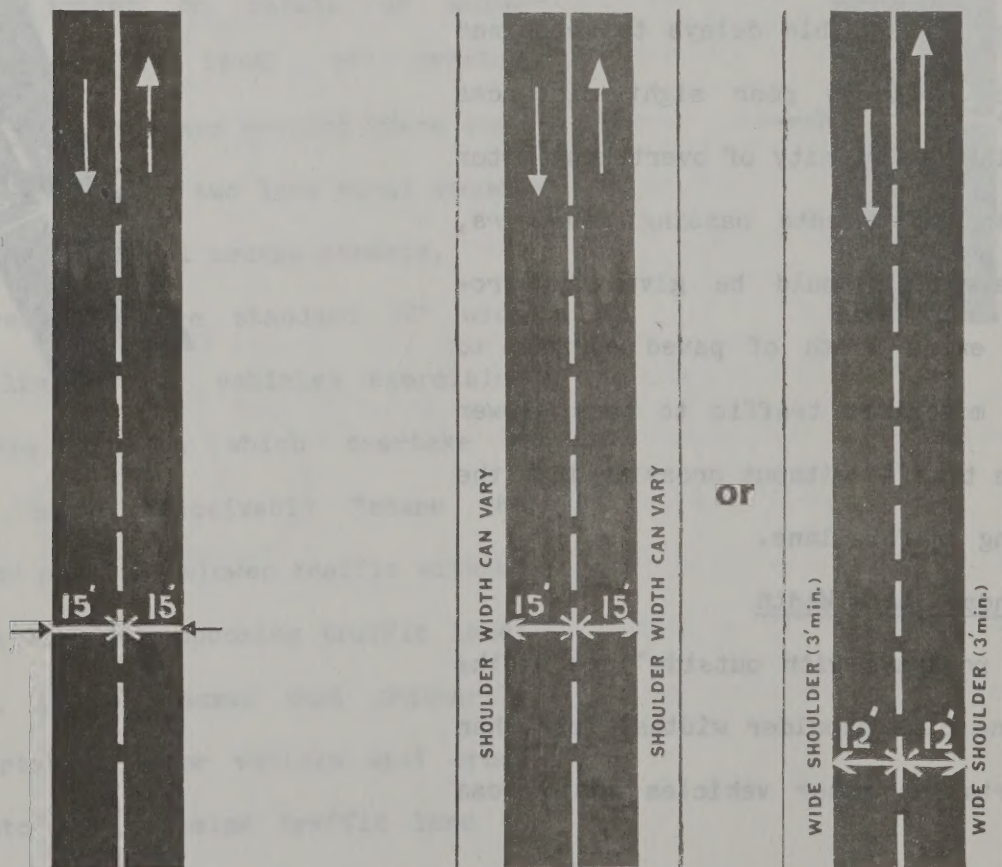
Traffic volumes: can vary

Traffic mix: can include heavy trucks

Traffic speeds: 45 mph or less

FIGURE 4

CONDITION II 2 LANE ROADS



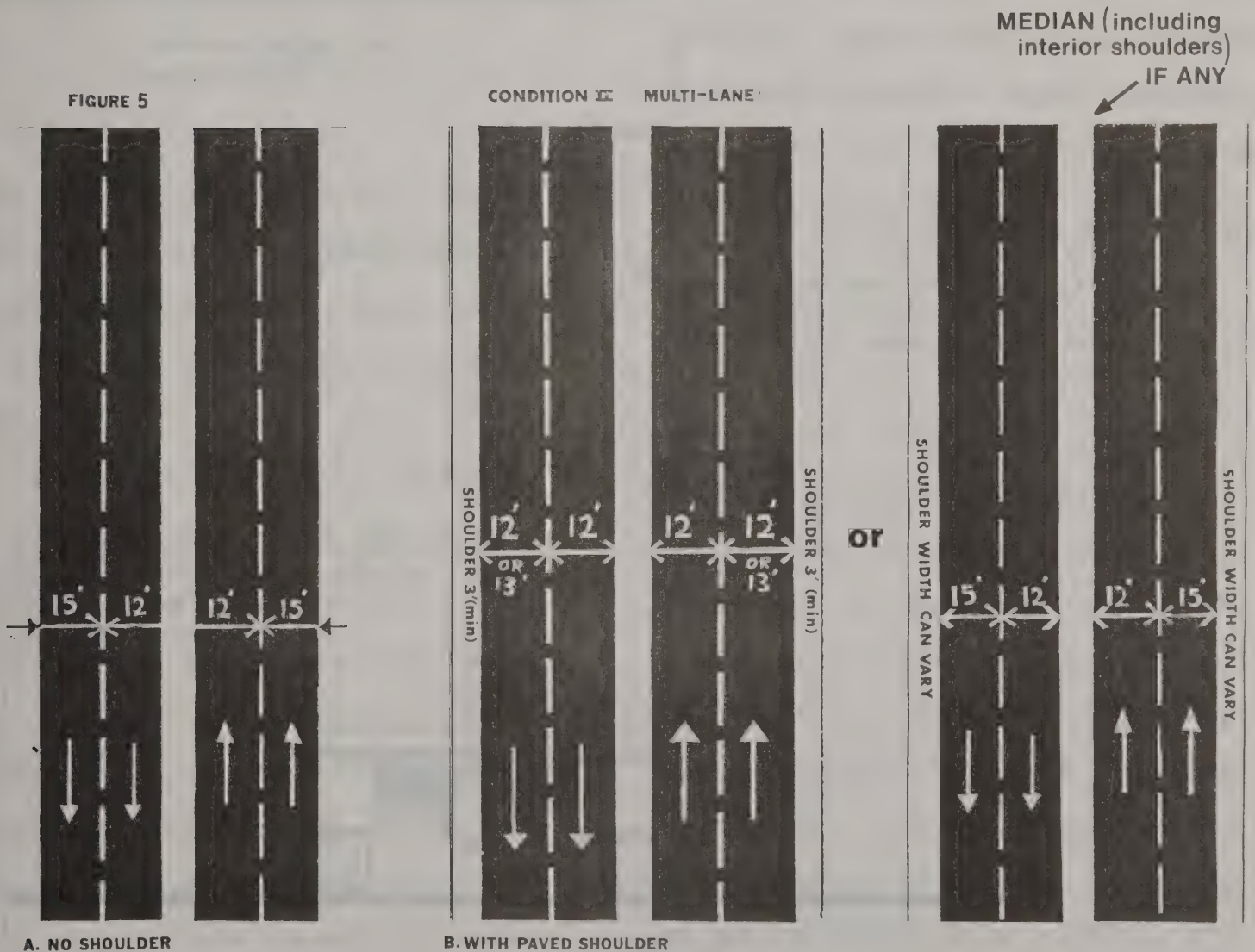
A. NO SHOULDER

B. WITH PAVED SHOULDER

Pavement Width Requirements

On projects involving roadways where traffic volumes are moderate to heavy, traffic speeds are 55 m.p.h. or less, and there are minimal volumes of heavy trucks, 15' of paved surface in the outside lane or outside lane plus useable shoulder is sufficient to accommodate shared use by the motor vehicle and bicycle traffic. Similarly, where the

traffic mix includes heavy trucks and traffic speeds are 45 m.p.h. or less, 15' of paved surface will permit lane sharing. (Figures 4, 5, 6, 7). This width of paved surface is sufficient to enable motor vehicle traffic to pass bicycle traffic without crossing into adjacent travel lanes, and it takes into account the effect of lateral aerodynamic forces on bicyclists caused by motor



vehicles at the traffic mixes and speeds which define this condition (Figure 8). This width also takes into account the fact that ordinarily a small portion of the outside edge of this space may not be usable because of drainage, debris, the unraveling of pavement edges, etc.

CONDITION III

Traffic volumes: moderate to heavy
 Traffic mix: includes more than minimal volumes of heavy trucks
 Traffic speeds: greater than 45 mph

Pavement Width Requirements:

On projects involving roadways where there are more than minimal volumes of

FIGURE 6
 CONDITION II(A)

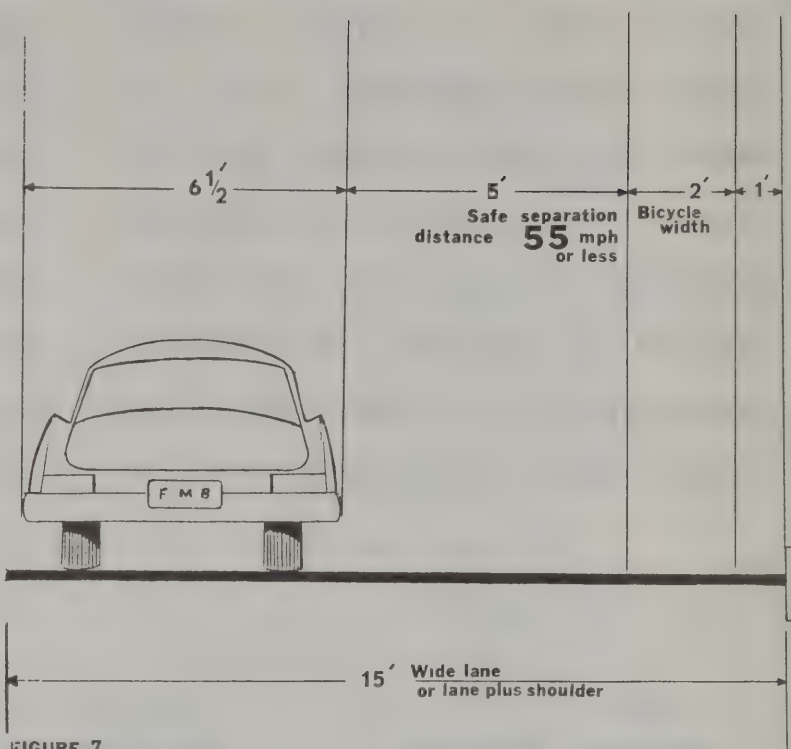


FIGURE 7
 CONDITION II(B)

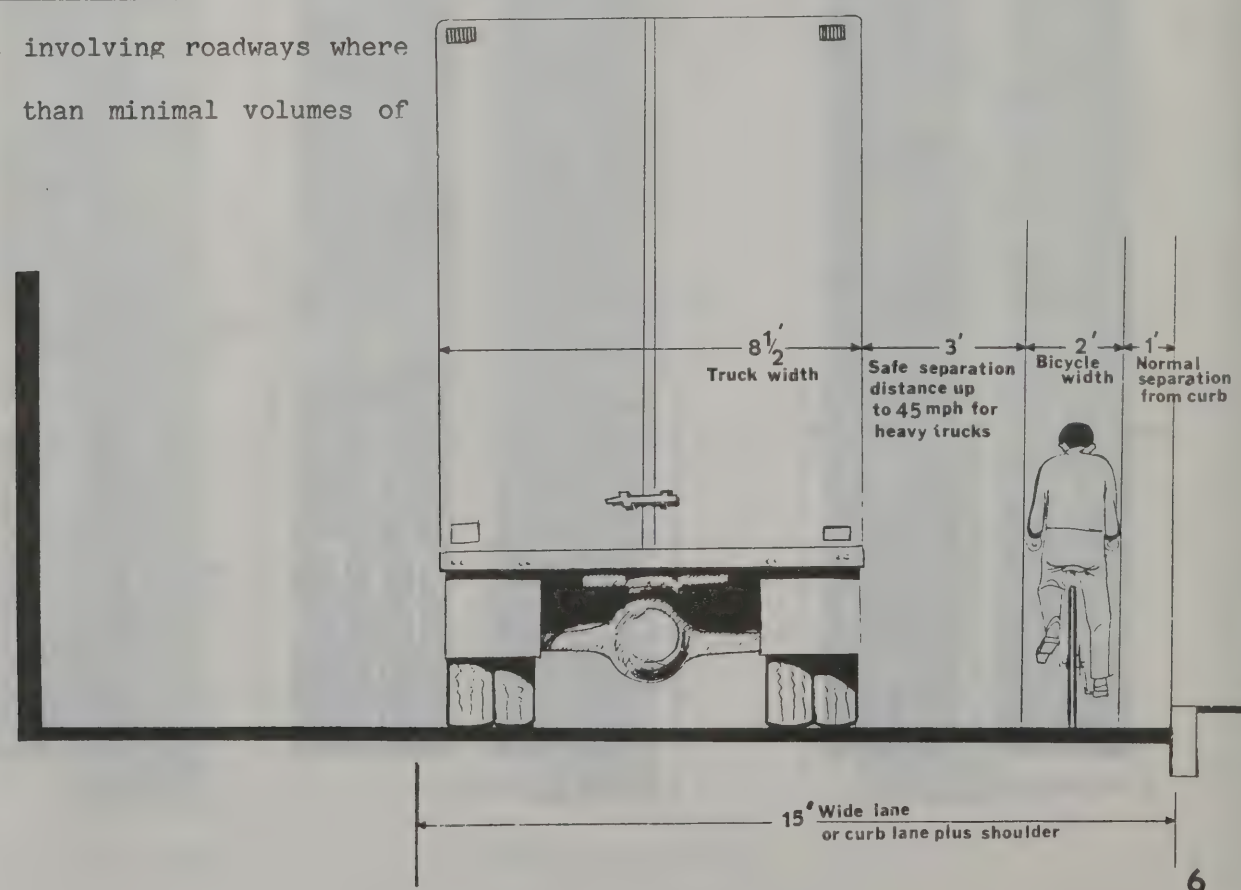
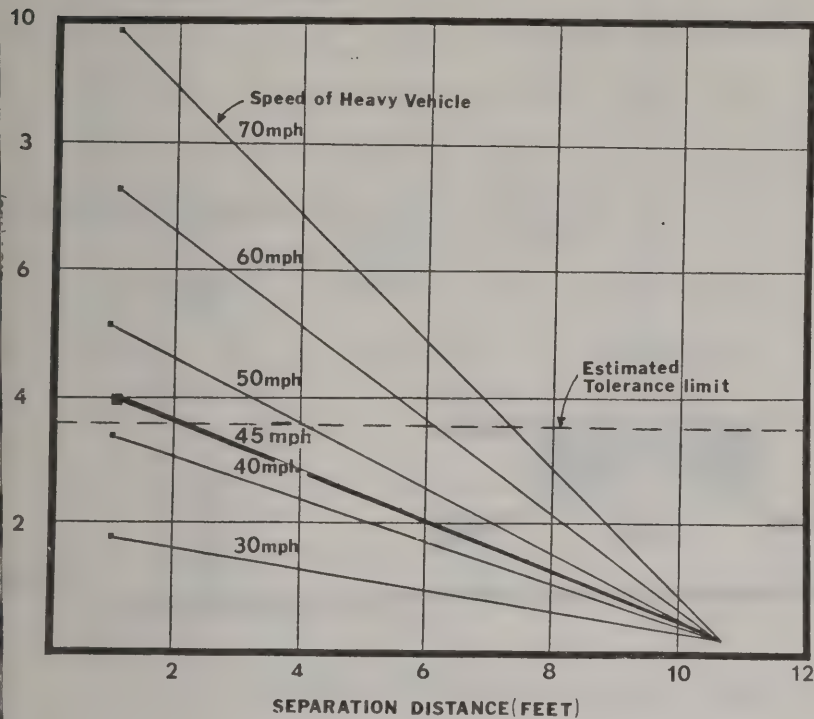


FIGURE 8

HEAVY VEHICLE INDUCED AERODYNAMIC DISTURBANCES



heavy truck traffic or traffic legally operates in excess of 45 mph, additional paved space to accommodate shared use by motor vehicles and bicycles is warranted (Figures 9,10).

In general, 18' of paved surface in the form of a wide outside lane or paved shoulder adjacent to the outside lane is sufficient to accommodate this shared use. This width provides enough space to allow for adequate separation of motor vehicle and bicycle traffic to take into account the effect of lateral aerodynamic forces on bicycles caused by motor

forces on bicycles caused by motor vehicles at the traffic mix and traffic speeds which define this condition.

This width also takes into account the fact that ordinarily a portion of the outside edge of pavement may not be usable due to drainage, debris, unraveled pavement etc.

The space made available to bicyclists through the implementation of this guideline is sufficient to provide the moderately skilled bicyclist, operating in accordance with the rules of the road, with adequate levels of safety and service. Ordinarily, it is neither necessary nor desirable to designate the lane sharing space in any way for the preferential use of bicycle traffic. Preferential signing or lane striping may act as an inducement for inexperienced or unskilled bicyclists to use the facility. Therefore, route signing or lane striping should only be employed where it has been determined that there is a special need for it, and where it can be implemented in accordance with appropriate sections of the AASHTO Guide for the Development of New Bicycle Facilities - 1981.

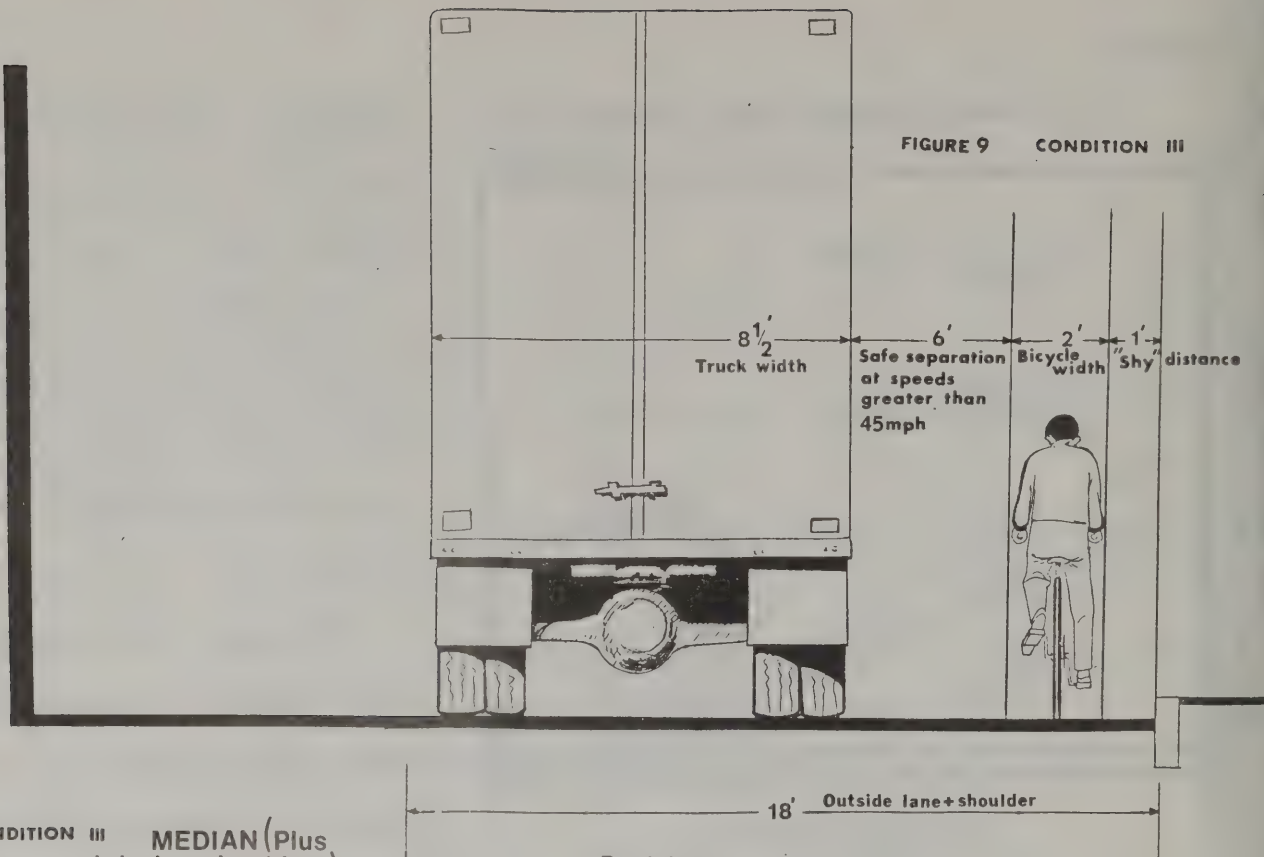
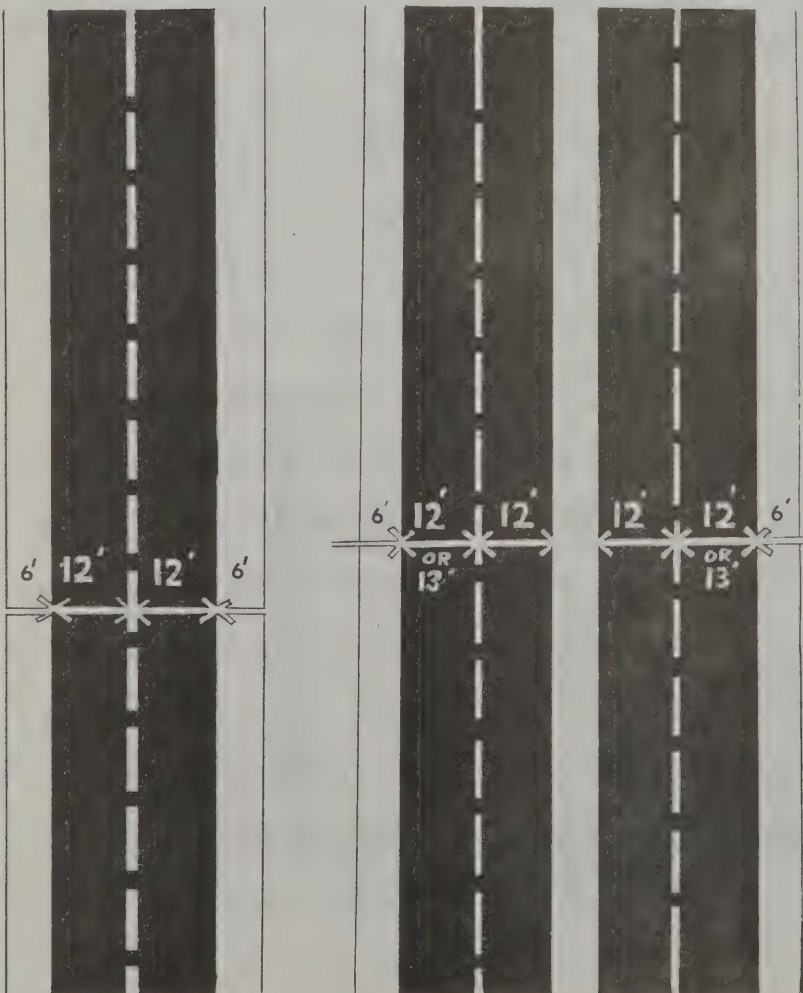


FIGURE 9 CONDITION III

CONDITION III MEDIAN (Plus interior shoulders IF ANY)

Parking

FIGURE 10



A. TWO LANE

B. MULTI-LANE

Parked vehicles complicate the needs of bicycle traffic. Bicycle traffic riding between a row of parked vehicles and moving motor vehicle traffic is subjected to the additional threats of opening car doors and the possible obscuring of intersecting traffic by parked vehicles.

Where parking is permitted on light traffic volume streets (Condition I), it is assumed that the travel lane is available to bicycle traffic and able to accommodate it (Figure 11). In such cases, a parking area (lane) of sufficient width to accommodate both bicycle traffic and parking vehicles is desirable but not necessary. A parking lane width

of 8' will ordinarily be sufficient. In other situations where parking is permitted, it can be assumed that the bicyclist is "sharing the lane" with a lane of parked vehicles (Figure 12). In such cases a parking lane width of at least 13' is desirable to accommodate bicycle traffic along with parked vehicles: 8'-10' for parked vehicles, 5' for bicycle traffic.

Pavement Surface Quality

With their narrow section, high pressure tires, and lack of suspension, bicycles require a smooth riding surface. Where shoulders are employed to provide the pavement width necessary to accommodate bicycle traffic, they should be paved with material as smooth as the adjacent travel lane. Bituminous concrete is preferred over asphaltic oil and gravel. The outside pavement area (where bicycle traffic normally operates) should be finished free of longitudinal seams. On portland cement concrete pavement transverse expansion joints (if necessary) should be saw-cut to insure a smooth ride.

Paved Shoulders vs Wide Outside Lanes

Where space in addition to the standard lane width is necessary to accommodate bicycle traffic two options have been provided: wide outside lanes or paved shoulders adjacent to the outside lane. Novice or inexperienced bicyclists tend to believe that a paved shoulder separated from the travel lane by an edge stripe will normalize the tracking paths of bicycles and motor vehicles and provide them with a safer operating space. There are some studies which suggest that lane striping (which provides an effect similar to edge striping plus paved shoulder) does confer positive benefits in terms of traffic operational flow characteristics and bicycle-motor vehicle collisions in mid-block (non-intersection) situations. However, bicyclists --particularly inexperienced bicyclists-- tend to have an exaggerated perception of the benefits conferred by delineating the space where motor vehicles are to operate, as the type of accidents on which such striping may have an effect

are relatively infrequent. Experienced bicyclists, on the other hand, tend to believe that the benefits of wide outside lanes (as opposed to standard width lanes with shoulders delineated by an edge stripe) outweigh the real and imagined benefits of such striping. Providing a wide outside lane as the space in which bicycle traffic can operate (with or without adjacent paved shoulder) permits motor vehicles to migrate into the area where bicyclists ordinarily operate. This is considered a benefit by experienced bicyclists because traffic "sweeps" the pavement free of debris. Accidents caused by debris (sand, gravel, grit), though usually unreported, are thought to occur relatively frequently. In addition, debris, particularly glass shards, cause a tremendous nuisance and cost to bicyclists from flat tires. Experienced bicyclists are relatively less timid, more willing to share operating space with motor vehicles, and value improved surface quality over the perceived benefits of delineated operating space.

Empirical studies have shown, however, that when outside lane width

FIGURE 11

PARKING
Condition I

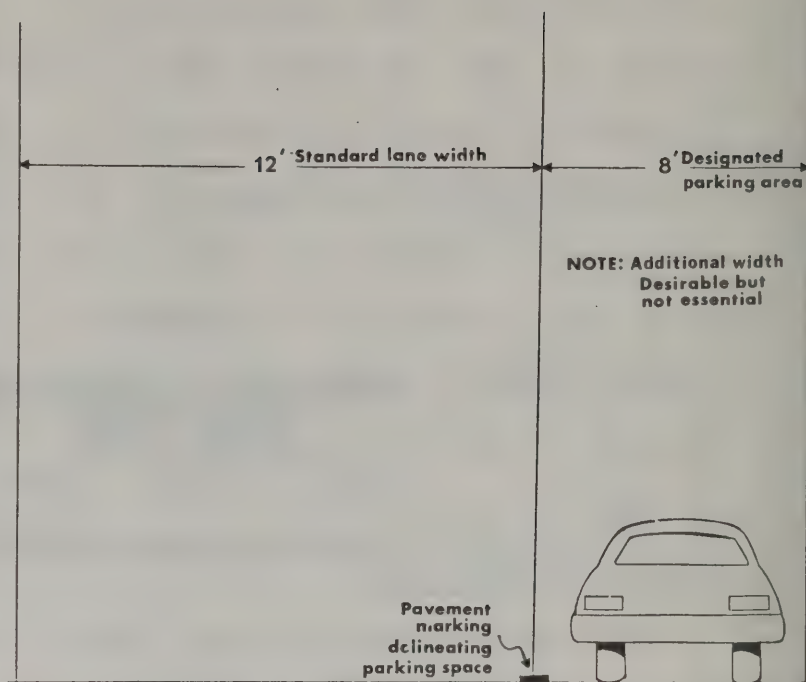
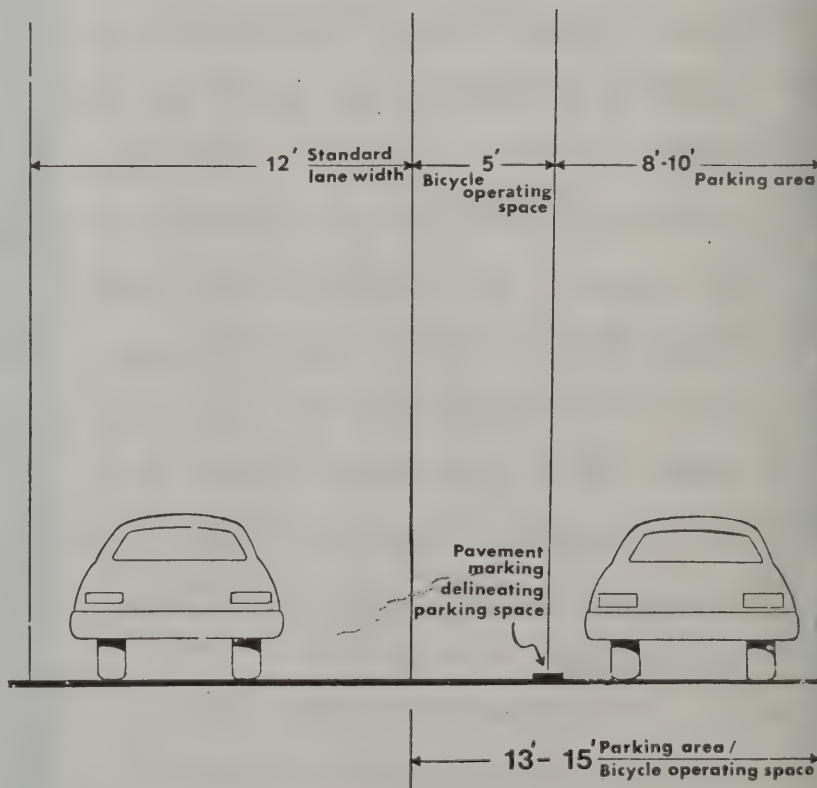


FIGURE 12

PARKING
Condition II



exceeds 15', then motor vehicle traffic tends to "double-up" in the wide lane at intersections and during periods of peak traffic volumes. Therefore, acceptable methods of providing sufficient width for shared use by motor vehicles and bicycles when additional space above the standard lane width is required is as follows:

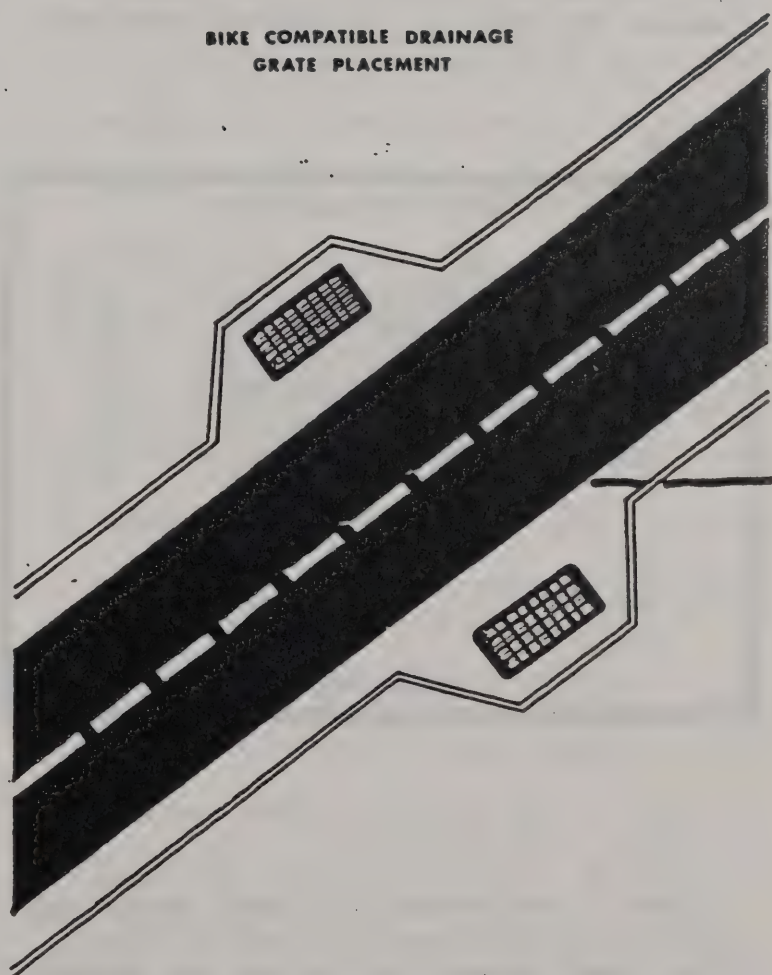
A 15' right hand lane (with or without shoulders for Conditions IIA and IIB) and 15' right hand lane plus 3'(minimum) shoulders for Condition III. A standard width right hand lane plus adjacent paved shoulder of sufficient width to create appropriate space for shared use (3' minimum for Conditions IIA and IIB and 6' minimum for Condition III) would be acceptable.

2. DRAINAGE GRATES

All drainage grate inlets pose some hazard to bicycle traffic. The greatest hazard comes from stream flow drainage grates which can trap the front wheel of a bicycle and cause the cyclist to lose steering control or have the narrow bicycle wheels drop into the grate --

resulting in both injury to the bicyclist and damage to the bicycle. When wet, any drainage inlet grate becomes slippery and poses the hazard of loss of control of the bicycle. Bicyclists encountering an inlet grate, particularly a stream flow grate, tend to swerve left to avoid the grate -- possibly into the path of overtaking motor vehicle traffic.

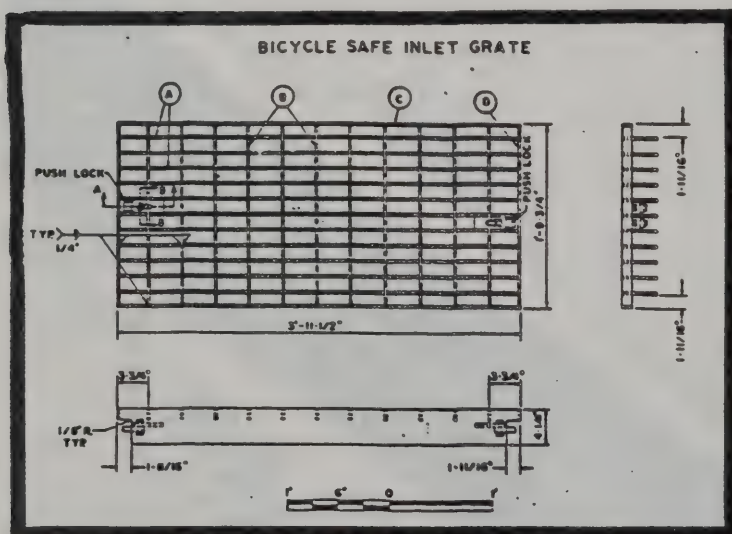
FIGURE 13



For these reasons, wherever possible, drainage inlet grates should be located outside the lane sharing area. This can be accomplished by using curb inlets instead of grates or installing inlet grates in a cove set back from the normal edge of pavement when sidewalk area is wide enough (Figure 13).

A "bicycle safe" drainage grate with acceptable hydraulic characteristics has been developed by NJDOT's drainage section (Figure 14). This inlet grate should be used in all normal applica-

FIGURE 14



tions. The stream flow grate should not be used except in unique or unusual situations which require its use and only outside the lane sharing area. Where projects offer the possibility for repla-

cement of stream flow grates located in the lane sharing area, these grates should be replaced with the "bicycle safe" grate.

3. UTILITY COVERS & OTHER SURFACE IRREGULARITIES

As pointed out in the section above, bicycle traffic is more sensitive to pavement irregularities than is motor vehicle traffic. During construction, appurtenances should not be left projecting above the pavement surface. Repeated resurfacings without adjusting the utility cover neck flange or drainage grate frames results in the covers being sunken below the pavement surface, a hazardous condition to bicycle traffic which bicyclists refer to as "black holes." Therefore, utility covers and drainage grates should be adjusted to fit flush with the roadway surface in all new construction, reconstruction and resurfacing projects.

Raised Roadway Reflectors

Although raised roadway reflectors provide substantial safety benefits in area of poor visibility, the fact remains that they are a surface irregularity which can be hazardous to bicycle traffic, especially since they are often placed in or near areas where bicyclists

ordinarily operate. Therefore, raised reflectors should only be used where necessary to insure traffic safety.

4. SIGNALIZED INTERSECTIONS

As legitimate users of New Jersey's roadways, bicyclists are subject to essentially the same rights and responsibilities as motorists. In order for bicyclists to properly obey traffic control devices, those devices must be selected and installed to take into account their needs. All traffic control devices should be placed so they can be observed by bicyclists who are properly positioned on the road. This includes programmed visibility signal heads.

Traffic-actuated signals should accommodate bicycle traffic. If there is no way for bicycle traffic to activate them, there is no alternative for the bicyclist but to proceed through the intersection against the light. Ideally, detectors for traffic-activated signals should be sensitive to bicycles and should be located in the bicyclist's expected path. Examples of successful installation of bicycle sensitive signal detectors appear in Bicycle Forum #6,

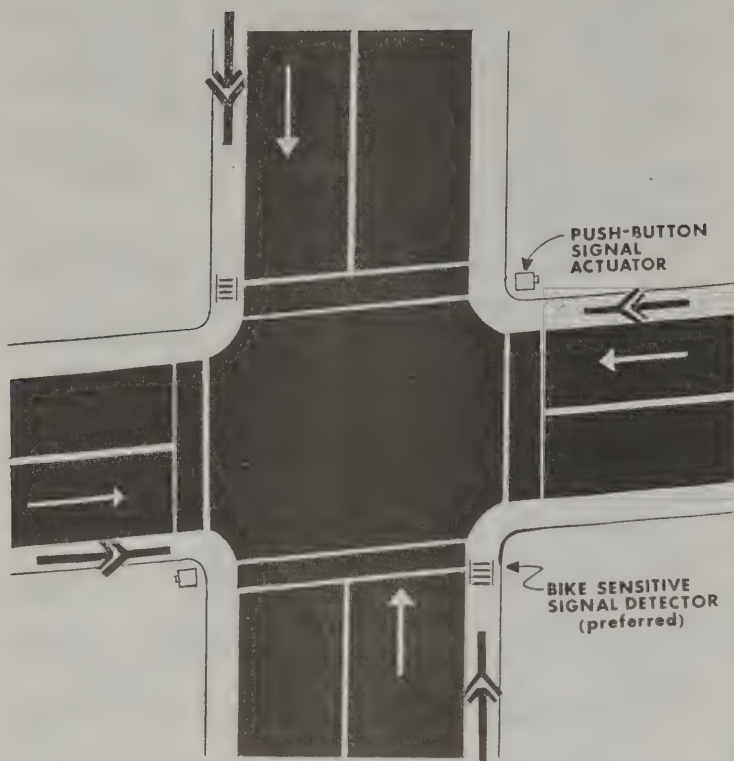
pages 14-15. Where this is not possible, pushbutton signal activators should be placed to be visible and reasonably accessible to the bicyclist's expected travel path (Figure 15).

Where moderate or heavy volumes of bicycle traffic exist or are anticipated, bicycles should be considered in the timing of the traffic signal cycle as well as in the selection and placement of the traffic detector device. In such cases short clearance intervals should not be used where bicyclists must cross multi-lane streets. According to the AASHTO Guide for the Development of New Bicycle Facilities - 1981, a bicycle speed of 10 mph (16 km/h) and a perception/reaction/braking time of 2.5 seconds can be used to check the clearance interval. Where necessary, an all-red clearance interval can be used.

5. RAILROAD GRADE CROSSINGS

As with other surface irregularities, railroad grade crossings are a potential hazard to bicycle traffic. To minimize this hazard, railroad grade crossings should, ideally, be at a right angle to the rails. This minimizes the possibi-

FIGURE 15



BICYCLE COMPATIBLE OPTIONS FOR TRAFFIC-ACTUATED
SIGNALIZED INTERSECTION

lity of a bicyclist's wheels being trapped in the rail flangeway, causing loss of control. Where this is not feasible, the shoulder (or wide outside lane) should be widened, or "blistered out" to permit bicyclists to cross at right angles (Figure 16).

It is also important that the railroad grade crossing be as smooth as possible. Pavement surface adjacent to the rail should be at the same elevation as the rail. Pavement should be maintained so that ridge build-up does not

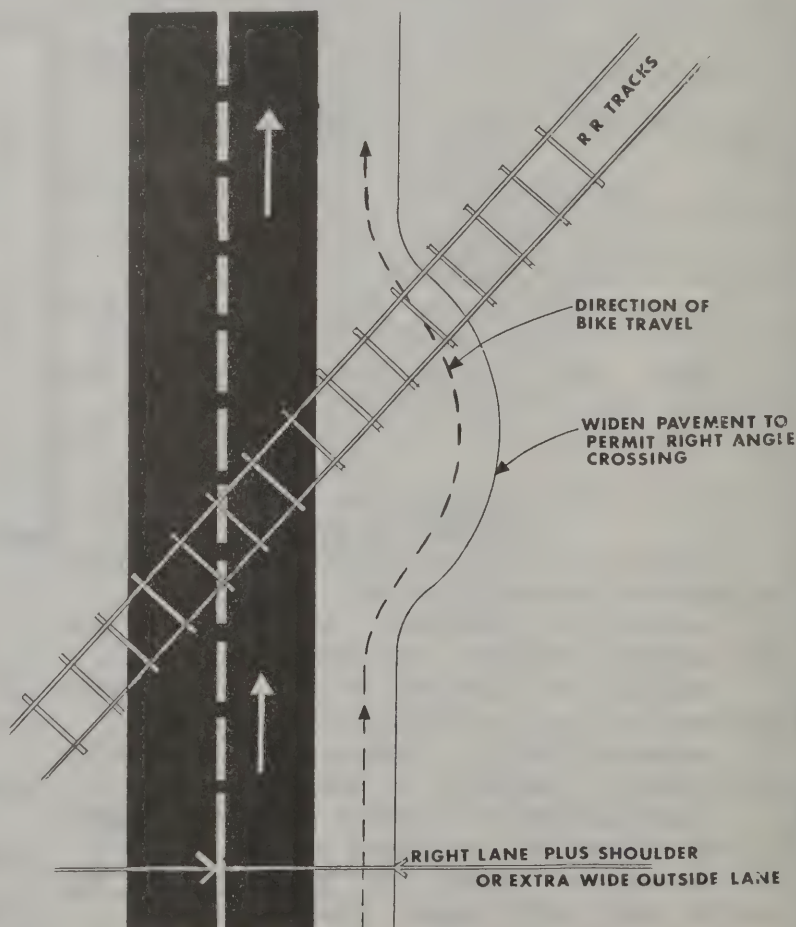
occur next to the rails.

Other options to provide a smooth grade crossing include: removal of abandoned tracks; use of compressible flangeway fillers, timber plank crossings, or rubber grade crossing systems.

These improvements should be included in any project which offers the opportunity to do so.

FIGURE 16

BICYCLE COMPATIBLE RAILROAD GRADE CROSSINGS



6. MAINTENANCE

The condition of the roadway surface is an important element in both bicycle safety and level of service. In general, due to their high pressure narrow profile tires, lack of suspension, and need to maintain balance, bicycles require a higher standard of road maintenance than motor vehicles. Potholes, bumps, seams, and debris -- which can be of minor annoyance or no consequence whatever to motor vehicles -- are potential hazards to bicycle traffic as these obstacles can cause loss of control of the bicycle, or cause the bicyclist to risk conflict with motor vehicle traffic by swerving to avoid the obstacles. Furthermore, debris, particularly broken glass fragments, is a constant nuisance which has been estimated nationally to cost over \$450,000,000 per year in direct losses to bicyclists.

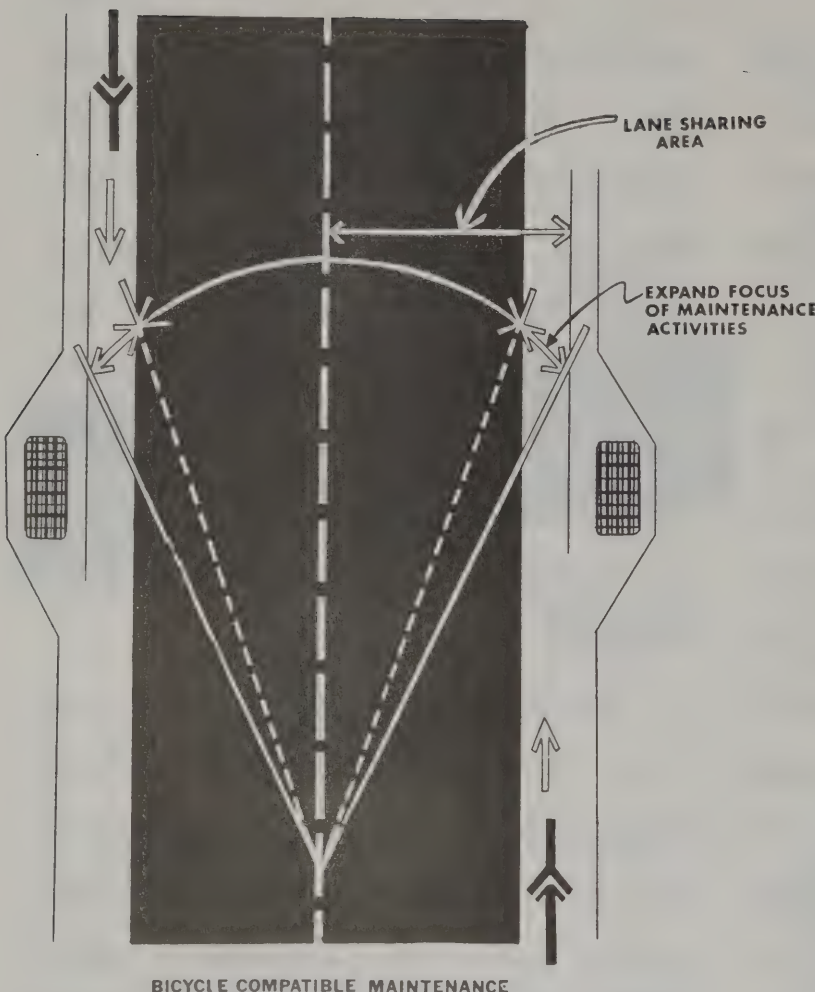
For the above-mentioned reasons, the roadway surface on which bicycles normally operate should be maintained free of potholes, bumps, corrugations, seams, unravelled pavement edges, gravel, glass fragments, and any other debris or

obstacles that mar a smooth riding surface. The area involved includes the right portion of the outside travel lane plus any additional space, identified under Item # 1 as necessary for "lane-sharing." Typically, this portion of the roadway gets marginal attention as maintenance efforts are concentrated on the portion of the roadway used by motor vehicles.

Maintenance repairs in this area should be carried out with the needs of the bicycle in mind i.e., they should be done in a workmanlike fashion with particular attention to providing a smooth pavement surface.

Maintenance of our roadways to accommodate bicycle traffic does not usually require changes in the types of maintenance activities that are carried out, rather it requires changes in the focus of maintenance practices (Figure 17). Where possible, maintenance repair and litter removal activities should be shifted to include, not ignore, roadway margins and shoulders, especially on roadways which are identified as those

FIGURE 17



7. PLACEMENT OF BEAM GUIDE RAIL LIGHT STANDARDS, SIGN POSTS, ETC.

In order to make certain that as much of the paved surface as possible is usable by bicycle traffic, sign posts, light standards, utility poles, and other similar appurtenances should be set back 1' minimum "shy distance" from the curbing or pavement edge with exceptions for guide beam placement in certain instances (Figure 18). Additional separation distance to lateral obstructions is desirable. Where there is currently insufficient width of paved surface to accommodate bicycle traffic (as identified in item # 1 then any placement of these appurtenances, should, where feasible, be set back far enough to allow room for future projects (widening, resurfacings) to bring pavement width into conformance with these guidelines (Figure 19).

Vertical clearance to obstructions should be a minimum of eight feet, six inches.

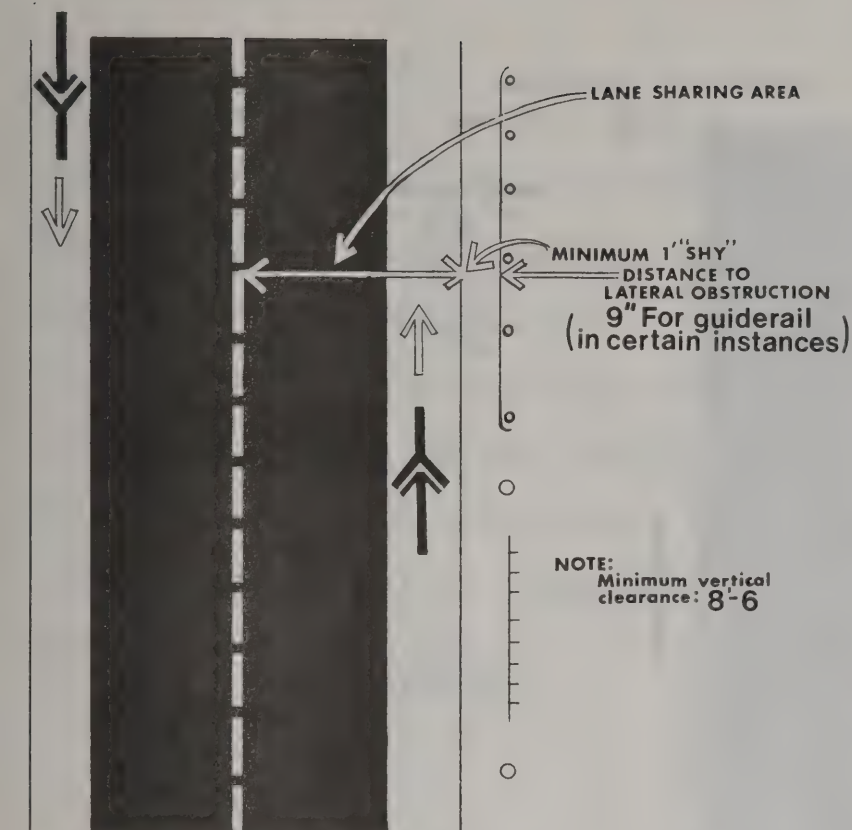
8. UNIMPROVED INTERSECTING STREETS AND DRIVEWAYS

Sand, gravel and other debris in the bicyclist's path present a potential hazard. In order to minimize the possi-

which bicyclists commonly use or are designated as bicycle routes, and where bicyclists bring to the Department's attention specific conditions which adversely affect bicycle traffic.

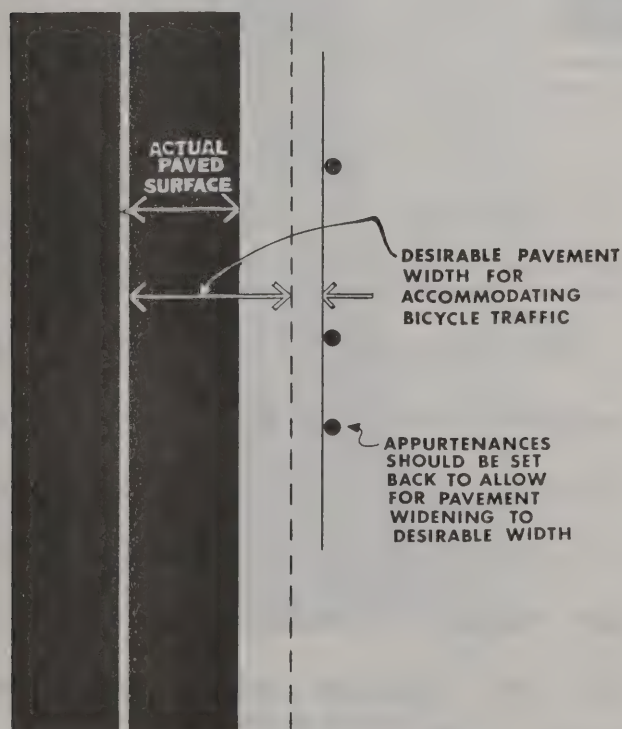
The use of a wide curb lane will limit the amount of grit and debris that collects in the bicycle operating (lane-sharing) area, as motor vehicle traffic will "sweep" this area clean.

FIGURE 18



CYCLE COMPATIBLE PLACEMENT OF GUIDE BEAM UTILITY POLES, ETC.

FIGURE 19

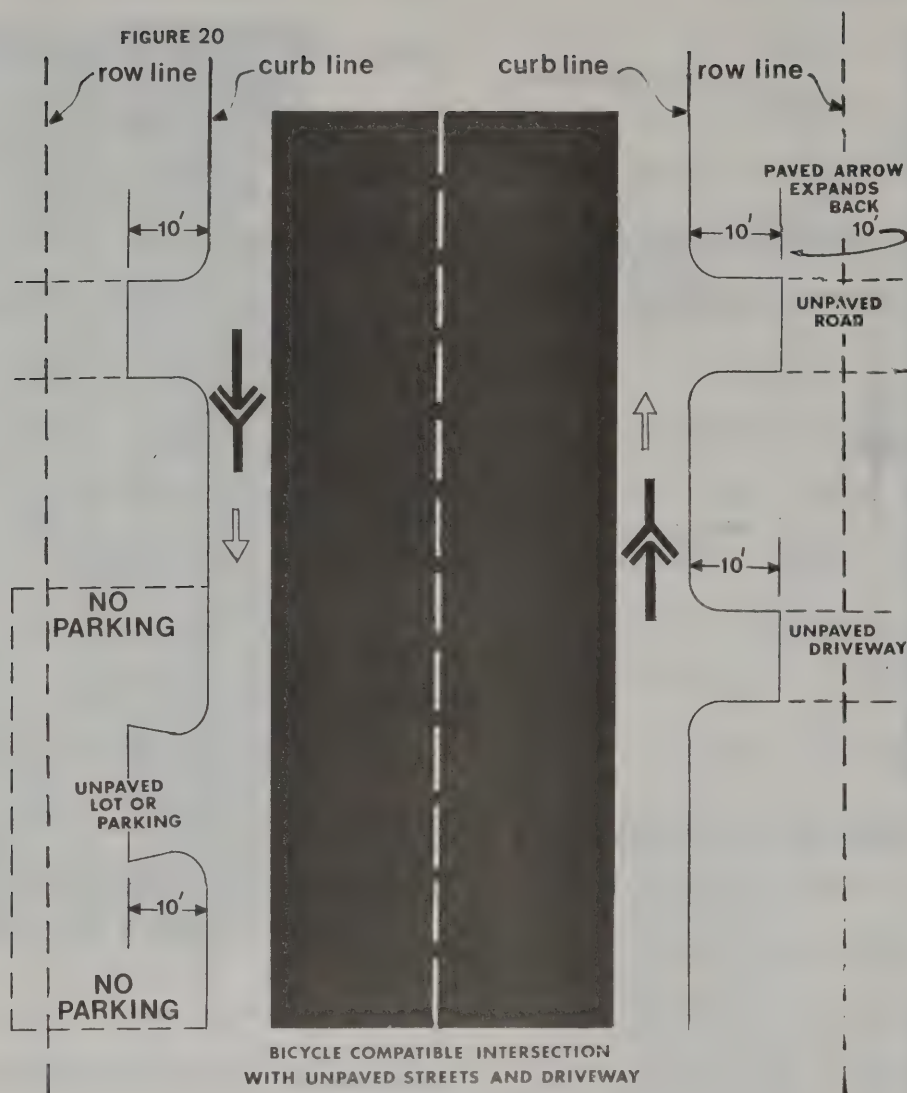


BICYCLE COMPATIBLE PLACEMENT OF GUIDE BEAM UTILITY POLES, ETC.

bility of debris from migrating onto or being drawn onto the pavement surface from unpaved intersecting streets and driveways, during new construction, reconstruction and resurfacings, all unimproved intersecting streets and driveways should be paved back a distance of 10 feet (Figure 20). Similarly, where curb cuts permit access to roadways from abutting unpaved parking lots, a paved apron should be paved back 10 feet from the curb line. These practices will lessen the need for maintenance debris removal. The placement of the paved back area or apron should be the responsibility of those requesting permits for access via curb cuts from driveways and parking lots onto the highway system.

9. TSM TYPE IMPROVEMENTS

There are many roads in New Jersey which adequately accommodate bicycle traffic. These are generally roads constructed with wide pavement surfaces allowing for wide outside lanes or paved shoulders. Unfortunately, attempts to maximize motor vehicle capacity through Transportation Systems Management (TSM) projects have ignored the needs of



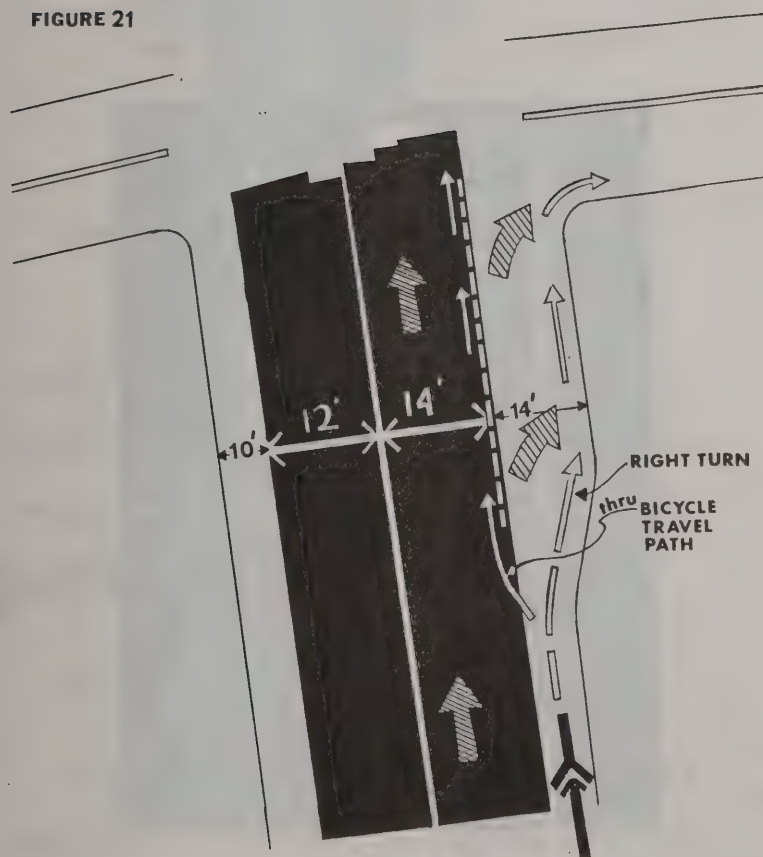
bicycle traffic and have sacrificed bicycle access. In TSM improvements, wide travel lanes or wide paved shoulders have been used to provide additional motor vehicle capacity as extra travel lanes, climbing lanes or turning lanes. These projects have often seriously degraded the ability of roadways to accommodate bicycle traffic. Other roads on which bicycle access was insufficient

to begin with have been rendered even more unaccommodating to bicycle traffic.

TSM projects carried out by this Department should consider bicycle access in addition to providing additional capacity for motor vehicles. Making certain our roadways accommodate bicycles provides the traveling public with alternatives to the motor vehicle for short distance trips.

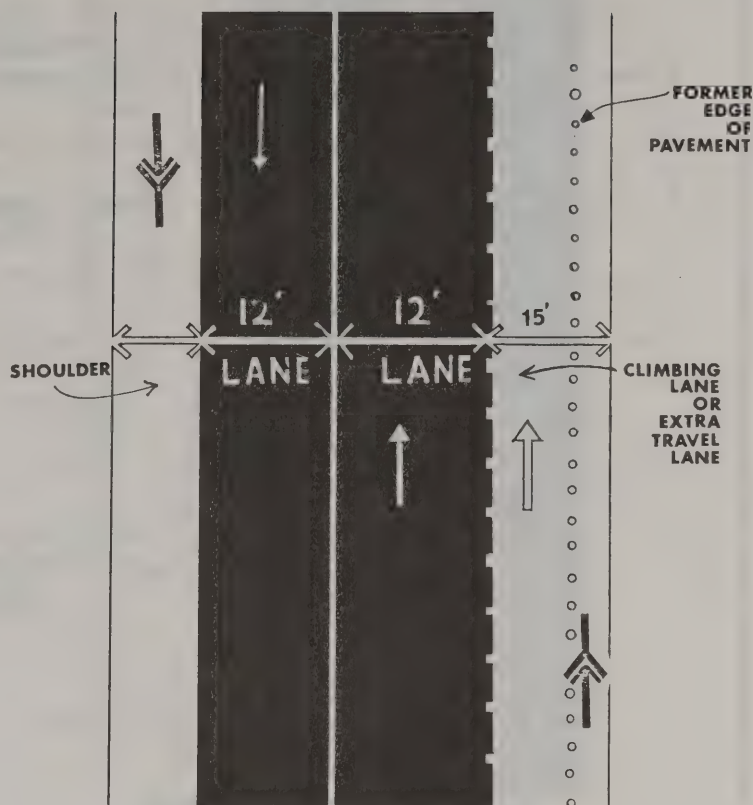
TSM projects should provide lanes of sufficient width to accommodate shared use by motor vehicles and bicycles (Figure 21). Generally, this would require outside turning lane width of 14 feet with interior (through) lanes 14' wide for intersection improvements and 15' wide outside lanes for climbing lanes and elsewhere (Figure 22).

FIGURE 21



A BICYCLE COMPATIBLE TSM PROJECT
(SHOULDER CONVERTED TO TURNING LANE)

FIGURE 22

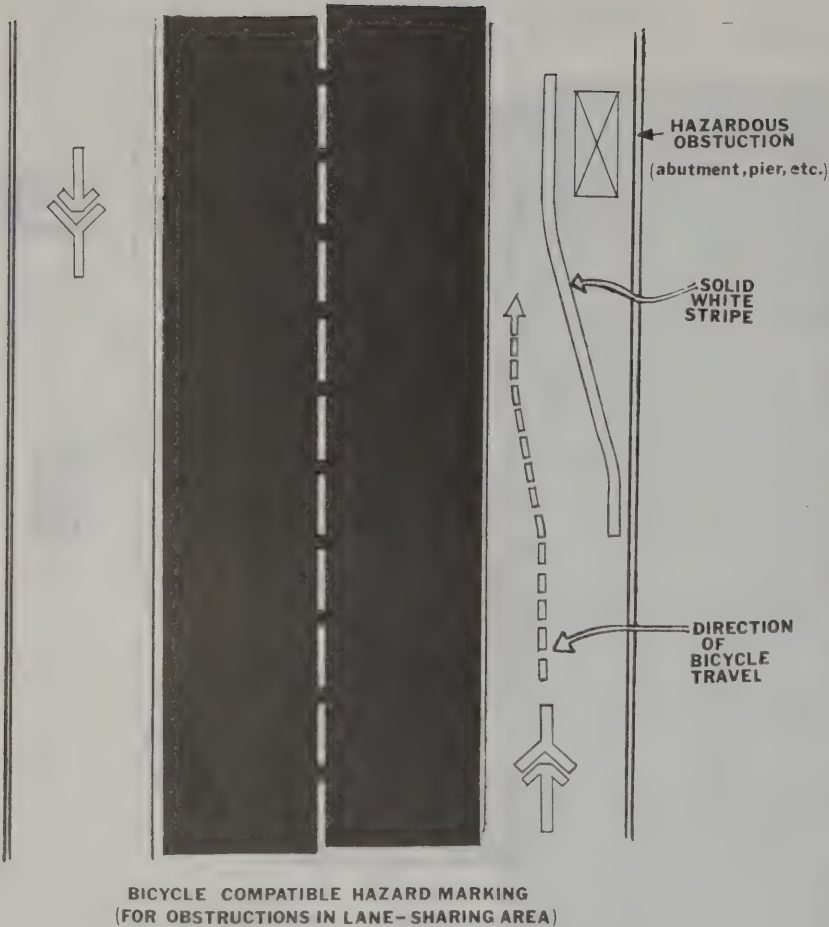


A BICYCLE COMPATIBLE TSM PROJECT
(SHOULDER CONVERTED TO CLIMBING LANE OR EXTRA TRAVEL LANE)

10. UNAVOIDABLE OBSTRUCTIONS

Ultimately, even with the most assiduous attention to bicycle compatible design, there may be instances or locations where it is not feasible to fully implement these guidelines, locations where unavoidable obstacles such as narrow bridges or travel lanes of insufficient width to accommodate shared use remain. In such cases, warning signs or

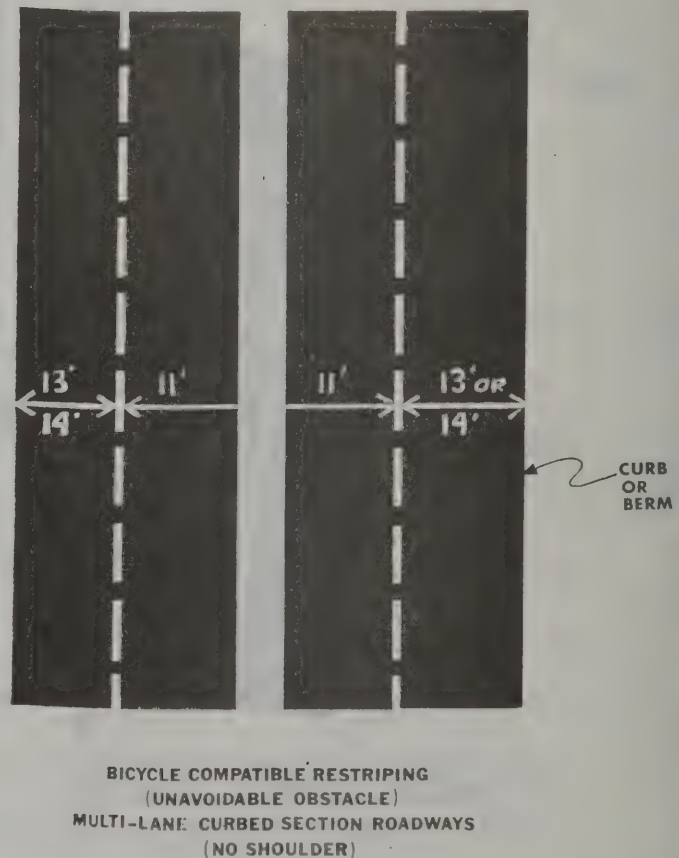
FIGURE 23



Where narrow bridges create a constriction, zebra warning striping on the shoulder should be used to shift motor vehicle traffic away from the parapet and provide space for bicycles (Figure 25).

Other possible strategies which may be employed as appropriate include elimination of parking where it is not needed (or restrict it to one side of the roadway), or the reduction in the number of travel lanes where traffic volumes warrant (Figure 26). This may be possible where new parallel highway fa-

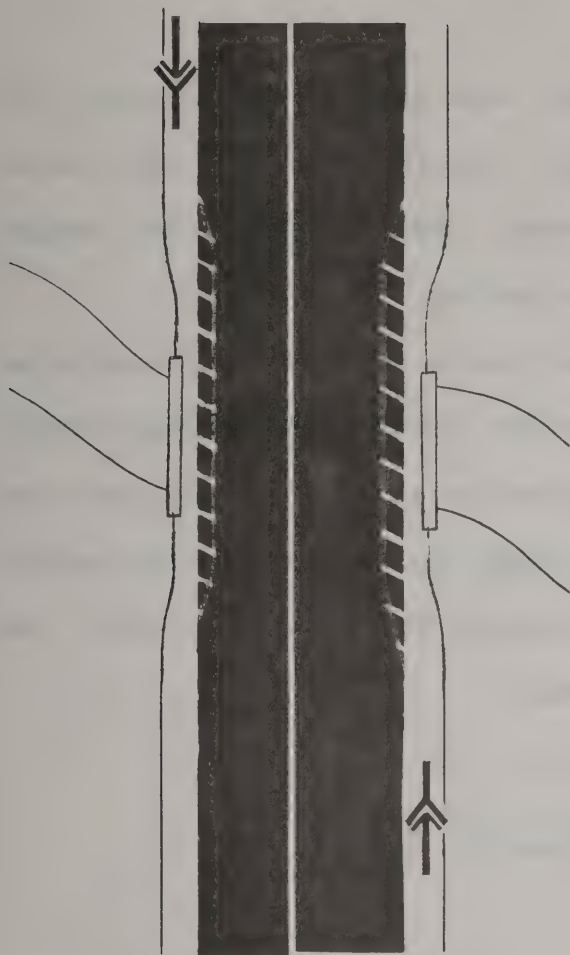
FIGURE 24
MEDIAN (including shoulders) — IF ANY



pavement striping should be employed to inform bicyclists of the obstruction, alert motorists to the possible presence of bicyclists, identify acceptable alternate routes (if they exist), or otherwise mitigate the obstruction (Figure 23).

Where it is impossible to provide sufficient width for lane sharing, conditions for bicycles should be improved by striping wider outside lanes and narrower interior lanes (Figure 24).

FIGURE 25



**BICYCLE COMPATIBLE STRIPING
(UNAVOIDABLE OBSTACLES)
ZEBRA WARNING STRIPING AROUND
NARROW BRIDGES OR OTHER CONSTRICTIONS**

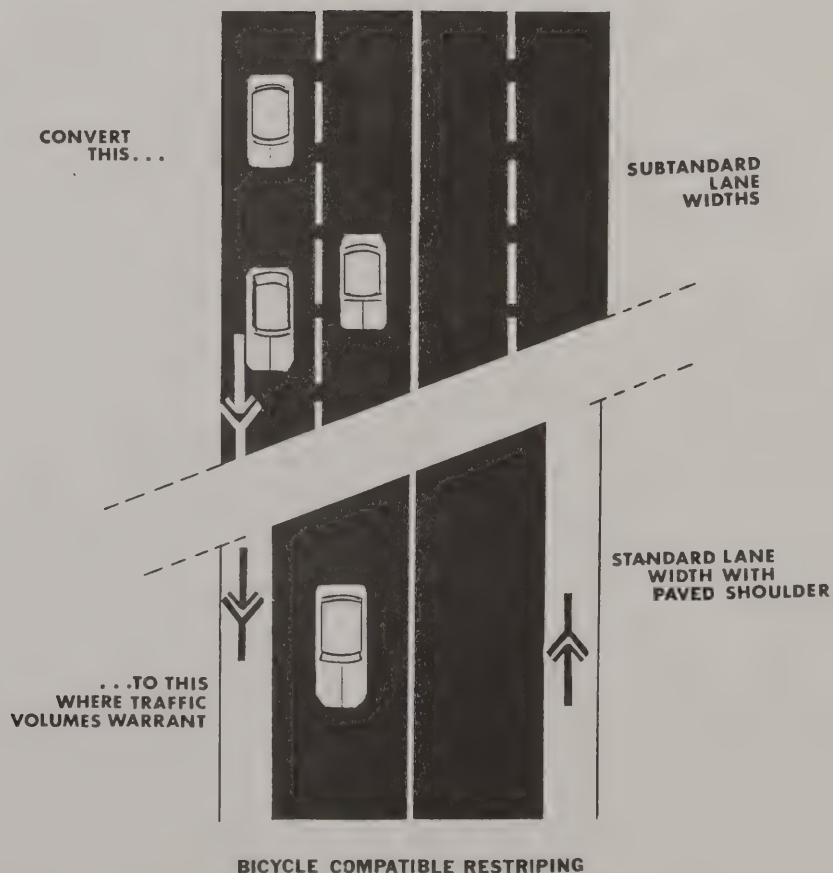
cilities (e.g., limited access facilities) have resulted in reduced traffic volumes on local streets or arterials.

11. BICYCLE MOBILITY OR ACCESSIBILITY STUDIES

The needs of bicycle traffic should be taken into account during the earliest stages of project development. For all major improvements requiring a location

or feasibility study, Environmental Assessment or Environmental Impact statement, a bicycle mobility or bicycle accessibility study should be carried out as a normal part of these studies. The study should identify problems or deficiencies in the ability of the transportation infrastructure in the project corridor to accommodate bicycle traffic. The study should also identify potential remedies to these deficiencies.

FIGURE 26



The study should not just focus on the design features necessary to make the project in question bicycle compatible, but should where feasible identify other bicycle transportation deficiencies in the corridor, such as intersecting non-bicycle compatible streets or roads which could provide bicycle access to and from residential areas, schools, local

shopping, work places, rail stations, if improved, opportunities for bike paths and lanes, and the need for secure bicycle parking.

The results of this study should be used as the basis for improving bicycle transportation in the corridor, both as part of the project in question and in future state-funded transportation improvements.

NJDOT December 1982

APPENDIX

NEW JERSEY DEPARTMENT OF TRANSPORTATION

BICYCLE TRANSPORTATION POLICY

AND

NEW JERSEY DEPARTMENT OF TRANSPORTATION

BICYCLE PLANNING AND DESIGN GUIDELINES

NEW JERSEY DEPARTMENT OF TRANSPORTATION BICYCLE POLICY

Bicycle Transportation Program Policy Statements originally appeared in the New Jersey Transportation Plan Volume I - Goals, Objectives and Program Policy (September, 1979) and were later revised and included in Volume III - Long Range Plan (December, 1981). These Program Policy Statements include recent revisions made and approved by the Commissioner in October, 1982.

Program Policy Statement from the Highways and Streets Program:

Consider Bicycle Traffic in Facilities Design and Construction

The bicycle is a legitimate and viable transportation mode. Therefore, where feasible, roadway projects should be constructed in such a way as to accommodate shared use by both motor vehicles and bicycles. Further, the bicycle will be encouraged as a viable option for short trips.

Introduction and Program Policy Statements from Bicycle Facilities and Programs:

Introduction

In an era of energy and environmental conservation awareness, the bicycle is an underutilized, inexpensive and beneficial form of travel. Bicycles can be used for short-trip utilitarian purposes such as travel to work, school, shopping, recreation areas and public transit stations. Due to the aforementioned benefits, the bicycle mode is an extremely equitable form of transportation and can enhance the mobility of many sectors of the state's population.

Although current popular interest in bicycling is at an all-time high and bicycling is the number one form of outdoor recreation in New Jersey, greater utilization is inhibited by level of service, safety, and security problems, both real and perceived. Though the majority of bicycle safety problems are due to inadequate cycling skills and inappropriate operating behavior, interaction with the auto mode, especially at roadway intersections, is a significant cause of bicycle accidents. Inadequate traveling surfaces and parallel grates and other barriers also contribute to bicycling hardships. Lack of secure parking facilities for bicycles is also a major deterrent to utilitarian use.

The state will seek to provide adequate facilities and roadways which incorporate bicyclists' needs, improve the bike/transit interface, promote increased use of the bicycle for short distance trips, and promote improved education of motorists and bicyclists regarding each other's rights and responsibilities. At the local level, emphasis should be on specific needs of a given municipality, and state assistance and support should be channeled in that direction.

Program Policy Statements

Promote Education of Both the Bicyclist and Motorist as the Most Effective Way to Reduce Bicycling Accidents, through Schools and Motor Vehicle Licensing and Registering

Education of both the bicyclist and the motorist is recommended as the most effective way to reduce bicycling accidents and thus promote confident bicycle use. Motorists must learn to understand bicyclists' abilities and problems. Bicycles are legitimate and legal vehicles on the road, a fact which many motorists remain unaware of or tend to overlook. Bicyclists need to improve their cycling skills, learn to ride with traffic, obey traffic signs and signals and observe all other rules of the road.

Schools are the logical place to teach children effective cycling techniques and the rules of the road; the automobile licensing and registration system is a simple and inexpensive way to reach the motorist; the electronic and printed media can reinforce the safety message to most of New Jersey's citizens.

Promote Statewide Bicycle Registration Administered at the Local Level to Inhibit Theft

Bicycle theft is a major deterrent to utilitarian bicycle use. Secure bicycle-locking facilities are badly needed, especially in urban business centers and near public transportation centers. A statewide bicycle registration system would help reduce theft by making the reselling of stolen bicycles difficult and would aid the police in returning stolen bicycles to their owners. Such a registration system would help to enforce safety equipment standards, legitimize the status of the bicycle as a vehicle, aid in the collection of safety statistics and user characteristics, and educate bicyclists on proper bicycling principles.

Facilitate the Use of Federal-Funds on the Local Level for the Costs of Supplementary Facilities such as Shelters, Parking Facilities, Bicycle Storage Facilities and Comfort Stations, Especially at Public Transit Stations and Terminals

The Federal Highway Administration (FHWA) allows the construction of bikeways as an incidental feature of regular highway improvements. FHWA can pay 75% of the cost of these bicycle facilities (90% in interstate construction), just as with any Federal Aid Highway project, with the state or local government paying the remaining portion. FHWA permits the use of up to \$2.5 million per state per year of highway funds to be spent on independent bicycle facilities. The department will work with local government to see that available resources are obtained and applied judiciously to maximize bicycle transportation benefits.

Provide Mapping which Identifies:

- local bikeways and bicycle-safe streets,
- tourist information such as scenic and historic routes having bikeways, and
- general biking information.

Bicycle suitability maps are an effective way to provide cyclists with route planning information. Such maps would show bikeways, safe streets and bridges, transit stop information, parking facilities and bicycle repair shops. Further, they serve as both a planning and education tool since they identify those portions of the transportation infrastructure which need to be improved to better accommodate bicycle traffic; and they could contain safety rules and practices. Maps could be sold at cost to supply money for future reprinting.

Promote the Improvement of Roadways and Provision of Ancillary Facilities to Accommodate Bicycles over the Construction of Bike Paths

Bike paths are relatively expensive, and in some cases, they have been constructed without careful consideration of the needs of bicycle transportation. Furthermore, substandard designs and inadequate maintenance have resulted in underutilized facilities. Where it has been determined that bicycle transportation problems exist, improving existing roadways so they accommodate bicycle traffic is usually a safer and more cost-effective solution than the construction of separate bike paths. This approach usually has the added benefit of improving conditions for motor vehicle traffic as well.

In roadway projects the needs of bicyclists should be incorporated into the design where feasible. This includes the provision of sufficient width of paved surface to enable bicycle traffic to share the road with motor vehicle traffic. In most cases, this would eliminate the need for a separate bike path.

In all future projects, the department will, where applicable, employ design criteria contained in the NJDOT Bicycle Planning and Design Guidelines and AASHTO Guide for Development of New Bicycle Facilities, 1981.

Advocate or Promote Concepts Conducive to or Permitting Bike Riding

The department will advocate or promote the amendment of local zoning and plan review ordinances to require bike parking facilities in all new building construction, the construction of local roads capable of accommodating bicycle traffic as well as other proposals or measures designed to improve the bicycling environment.

Statements on Bicycle Transportation policy from Scenario II* and Scenario III* of the New Jersey Transportation Plan - Long Range Plan (Volume III)

from Scenario II:

Under this scenario, it is desirable to carry out all highway improvements and maintenance in a manner consistent with the needs of pedestrians and bicyclists. In anticipation of (and to promote) increased use of bicycles, the state's roadways should be capable of accommodating shared use by motor vehicles and bicycles. Bike parking should be provided at rail stations, places of employment, and other typical destinations; and selected improvements to benefit bicycle access could be carried out where warranted.

from Scenario III:

Inasmuch as over 60 percent of all trips are of a local nature, i.e., five miles or less in length, the state would continue to recognize the importance of non-motorized travel modes such as bicycling and walking. The state would continue to develop and maintain programs aimed at promoting an increased use of bicycling, walking and other similar modes.

Under this scenario, it would be imperative that all roadway projects be constructed in accordance with pedestrian and bicyclists needs. To provide for the increased use of these modes, all roadways should be capable of accommodating the shared use of motorized and non-motorized modes. Secure bike parking at typical destinations and intermodal transfer points should be provided. Improvements to the roadway system to facilitate bicycle access should be carried out in selected locations.

*The Long Range Plan presents four scenarios covering the next two decades based on varying assumptions regarding energy availability and the department's policy and programs for each scenario. Scenarios I and IV are considered as boundary scenarios designed to help focus on the proper range and degree of energy availability. These boundary scenarios are extremes of situations and as such are possible although improbable futures. Scenarios II and III focus on more likely availabilities of petroleum supplies. Scenario II reflects an extrapolation of recent trends which requires moderate energy conservation. Scenario III assumes a moderate energy shortfall requiring stringent energy conservation.

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NEW JERSEY DEPARTMENT OF TRANSPORTATION

BICYCLE PLANNING AND DESIGN GUIDELINES

1. SUFFICIENT SPACE FOR LANE SHARING

All state funded projects should provide sufficient width of smoothly paved surface to accommodate the shared use of the roadway by bicycles and motor vehicles. In general, 15' of smoothly paved surface is required in the outside lane (or in the outside lane plus adjacent shoulder) to accommodate shared use. On roadways with less than - say - 1200 ADT, no space in addition to the regular travel lane is needed. On roadways with high speed heavy truck traffic more space is required (18', or 12' plus 6' shoulder minimum).

2. DRAINAGE GRATES

Wherever possible, drainage grates should be located outside the "lane sharing" area. Only bicycle safe drainage grates should be used on the roadway surface where bicyclists are likely to operate, i.e., the smoothly paved area defined above, generally the outside lane, or the outside lane plus the portion of the shoulder necessary to make the 15' "lane sharing" area.

The Department should adopt a schedule for the replacement or modification of existing slotted drainage grates which infringe upon the "lane sharing" area.

3. UTILITY COVERS & OTHER SURFACE IRREGULARITIES

The roadway - especially where bicycles operate - should be free from utility covers, or other irregularities which protrude above or are sunken below the roadway surface. These should be flush with the roadway surface. Raised roadway reflectors are an obstruction to bicycles. They should be used as an edge line demarcator only in hazardous areas of poor visibility where necessary to insure motor vehicle safety.

4. SIGNALIZED INTERSECTIONS

Signals at intersections must be designed to accommodate bicycle traffic. Where signals are tripped by induction loop detectors, bicycle sensitive loop detectors should be used in all legs of the intersection or push button signal actuators should be placed so as to be visible to and within reasonable proximity to the bicyclists' expected travel path.

5. RAILROAD GRADE CROSSING

Railroad grade crossings should be as smooth as possible. Where railroad tracks do not cross at a right angle, the pavement should be widened or "blistered out" to provide bicyclists sufficient space to cross the tracks orthogonally without entering the motor vehicle traffic stream.

6. MAINTENANCE

The roadway surface on which bicycles operate, i.e., the "lane sharing" area, must be reasonably free of potholes, bumps, seams and debris. Otherwise, bicyclists will move left to avoid these obstacles and debris (into the motor vehicle traffic stream) or they will risk accident and injury by riding through these obstacles or the debris. Pothole repair and other maintenance activities in the "lane sharing" area should be carried out so that there is a smooth, flush, debris free surface.

In general, bicycles require a higher standard of roadway maintenance than motor vehicle traffic.

7. PLACEMENT OF BEAM GUIDE RAIL, SIGN POSTS, ETC.

Beam guide rail, sign posts, utility poles and the like should not be placed immediately adjacent to the paved surface. Where feasible, they should be set back at least 1' ("shy distance") from the pavement; otherwise, the effective width of bicycling space is reduced.

8. UNIMPROVED INTERSECTING STREETS AND DRIVEWAYS

Unimproved (gravel, dirt) intersecting streets and driveways should be paved back to prevent surface material (gravel, debris, dust) from migrating onto the bicyclist's riding space (10' back from the curb line for roads, and as far back as practicable for driveways).

9. TSM TYPE IMPROVEMENTS

Attempts to maximize the motor vehicle capacity of intersections should not sacrifice bicycle access. Where it is absolutely necessary to coopt a bike rideable shoulder for use as a right turn lane, the turning lane and through lane should be made extra wide - say 14' - to accommodate the shared use of these lanes by bikes and motor vehicles.

10. UNAVOIDABLE OBSTRUCTIONS

Where there are unavoidable obstacles, obstructions or barriers (e.g., narrow bridges), warning signs or pavement striping should be employed to alert motorists to possible bicycle presence or to otherwise mitigate the obstruction.

Where it is absolutely impossible to provide sufficient space for lane sharing, it is possible in some situations to improve conditions by a variety of paint striping strategies. For example, on a 48' curbed section roadway, rather than stripe for four (4) 12' lanes, the roadway could be striped for 11' wide interior lanes and 13' wide outside lanes.

11. BICYCLE MOBILITY OR ACCESSIBILITY STUDIES

A bicycle mobility or accessibility study should be carried out during the preliminary engineering phase of project development for all major corridor improvements requiring a location study or feasibility study. The results of the study should be used as a basis for improving bicycle transportation in the corridor.

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